# The Four Groups of Biologically Important Compounds

<table>
<thead>
<tr>
<th>Group</th>
<th>Carbohydrates</th>
<th>Lipids</th>
<th>Polypeptides &amp; proteins</th>
<th>Nucleic acids</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>sugars, starches, etc.</td>
<td>fats, oils, waxes, etc.</td>
<td></td>
<td>DNA &amp; RNA</td>
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<tr>
<td>What elements are found in this group?</td>
<td>carbon, hydrogen and oxygen</td>
<td>carbon, hydrogen and oxygen (nitrogen and phosphorus in some)</td>
<td>carbon, hydrogen, oxygen, nitrogen &amp; usually sulfur</td>
<td>carbon, hydrogen, oxygen, nitrogen, phosphorus</td>
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<tr>
<td>What are the monomers called?</td>
<td>monosaccharides: glucose &quot;blood sugar&quot; fructose &quot;fruit sugar&quot; galactose (these are all isomers of C₆H₁₂O₆)</td>
<td>fatty acids and glycerol (make up mono-, di-, &amp; tri-glycerides)</td>
<td>amino acids &quot;AA&quot;</td>
<td>nucleotides</td>
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<td>• FA are long chain with 1 polar end and 1 non-polar end</td>
<td>• 20 different amino acids used in making</td>
<td>• each one has a 5-carbon sugar, a N-base and a phosphate group</td>
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<td>Dimers and polymers</td>
<td>disaccharides: maltose=glucose+glucose sucrose=glucose+fructose lactose=glucose+galactose</td>
<td>triglycerides – 3 FA all linked to 1 glycerol (diglycerides have 2 FA linked to 1 glycerol) ex: oils &amp; fats</td>
<td>AA join to form polypeptides</td>
<td>a nucleic acid is a chain made up of many nucleotides</td>
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<td>polysaccharides - can be single long chains, repeating branched chains of m.s.</td>
<td>steroids – no FA…made of 4 interlocking carbon rings. classified as a lipid due to not dissolving in water</td>
<td>the bond between AA is called a peptide bond</td>
<td>DNA's nucleotides contain deoxyribose; RNA's contain ribose</td>
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<td>waxes – long chain alcohols</td>
<td>2 or more polypeptide chains &quot;tangle&quot; together to form a protein</td>
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</tbody>
</table>
| Other information | polysaccharide examples:  
• starch is a long-chain glucose polymer used by plants to store energy  
• cellulose is a long-chain glucose polymer that makes up most of the cell walls in plants. Humans can't break the bonds between the glucose monomers due to lack of the needed enzyme (i.e. we can't digest it…AKA fiber)  
• glycogen is a branching glucose polymer sometimes called animal starch. Animals can easily break off glucose from glycogen to used the energy.  
• chitin is a tough polysaccharide in the exoskeletons of insects, shrimp, etc. and in the cell walls of fungi. | lipids do not dissolve in water  
• major component of cell membranes  
• store high amounts of energy  
• protect vital organs and insulate | hemoglobin has 574 AA arranged in 4 polypeptide chains  
• proteins have a specific shape that determines their function. If the shape changes…it can no longer do its job  
6 general types of proteins:  
1. enzymes*  
2. structural  
3. contractile  
4. signal  
5. transport  
6. defense  
* We will spend time looking specifically at enzymes | DNA  
• stores info. for all cell activities  
RNA  
• transfersinfo. for making proteins |

| Demonstrations/labs done in class | • testing for sugar using Benedicts solution  
• testing for starches using iodine  
• taste tests of sugars | • simple brown paper bag test  
• insulation value of fats | enzyme demonstrations:  
• cracker in saliva  
• gelatin w/ fresh pineapple vs. canned  
• gelatin w/ meat tenderizer  
• enzymatic activity of raw vs. cooked liver  
• bread vs. with saliva iodine test | DNA extraction from foods |